
REMARKS

This communication is a full and timely response to the non-final Office Action dated July 8, 2004 (Paper No./Mail Date 7). By this communication, claims 1 and 3 have been amended and claims 5 and 6 have been added.

Each of claims 1 and 3 have been amended to delete the phrase "enlarging or reducing." No new matter has been added.

Claim 5 has been added. Support for the subject matter recited in claim 5 can be found variously throughout the specification, for example, at page 12, lines 11-25 and page 13, lines 14-24. No new matter has been added.

Claim 6 has been added. Support for the subject matter recited in claim 6 can be found variously throughout the specification, for example, at page 7, lines 21-24. No new matter has been added.

Claims 1-6 are pending where claims 1 and 3 are independent.

Rejections Under 35 U.S.C. §103

Claims 1 and 3 were rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of *Okada et al.*, U.S. Patent No. 6,704,463 and *Nakami et al.*, U.S. Patent No. 6,510,254. Applicant respectfully traverses this rejection.

Claim 1 recites an image processing method for a digital image, characterized in that interpolation signals between discrete original pixels used for calculating an output pixel value are calculated by an FIR digital filter using as an interpolation function a function obtained by composing a function based on a cubic convolution method and a function based on a bilinear method.

Claim 3 recites an image processing device for a digital image, characterized by comprising an FIR digital filter using as an interpolation function a function obtained by composing a function based on a cubic convolution method and a function based on a bilinear method for an interpolation signal between discrete -original pixels used for calculating an output pixel value.

In summary, each of claims 1 and 3 recite an image processing method and device using a function composed through a cubic convolution method and a function based on a bilinear method. As a result, a high frequency-band emphasis type characteristic that reduces the taps needed is realized.

In contrast, both *Okada* and *Nakami* only show conventional filters with four taps (memories). See Fig. 1 of *Okada*. The function used in the filters of *Okada* and *Nakami*, is a function similar to the cubic function shown in Fig. 13 of the instant application. The Office Action acknowledges that *Okada* fails to disclose, teach, or suggest a function obtained by composing both cubic convolution and bilinear methods. In remedying the deficiency of *Okada*, the Office Action alleges that *Nakami* discloses a hybrid bicubic function that increases the sharpness of an image. However, the hybrid bicubic function of *Nakami* merely adjusts the shape of a curve of the cubic function (*Nakami*, column 11, 20-82). Moreover, *Nakami* discloses that the hybrid bicubic function requires four taps to achieve the desired filtering result. As known in the art and inherent from the term "cubic," both the cubic method and the hybrid bicubic method need four pixels, and as a result four taps, to produce an interpolated signal that is similar to the signal shown in Fig. 12 of the instant application. The hybrid bicubic function of *Nakami* is not obtained by composing a function based on a cubic convolution method and a function based on a bilinear method. Thus, even if the hybrid bicubic function as disclosed in *Nakami* is combinable with *Okada* neither a reduction in the number of taps nor a reduction in the scale of the circuit can be realized.

In addition, and as shown in Fig. 19, *Nakami* never uses a right and left interpolation asymmetric. *Nakami* merely shows the right (x or $t > 0$) part of the interpolation result. Particularly, *Nakami* fails to disclose or mention any aspects regarding the symmetry of the interpolation because generally this characteristic is inherent in interpolation functions, as most interpolation functions are symmetric with respect to the right and left. As discussed above, an interpolation method having an interpolation function composed from the combination of the bilinear interpolation method and the cubic convolution method results in an interpolation function having a high frequency-band emphasis, a reduced number of taps, and a reduction in the scale of circuitry. For at least this reason, *Nakami* and *Okada* either singly or combined, fail to disclose, teach, or suggest at least, composing a function based on a cubic convolution method and a function based on a bilinear method, as recited in claims 1 and 3. Accordingly, a *prima facie* case for obviousness has not been established.

To establish *prima facie* obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). Moreover, obviousness "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or

suggestion supporting the combination." ACS Hosp. Sys. V. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). Accordingly, Applicant respectfully requests that the rejection of claims 1 and 3 under 35 U.S.C. §103 be withdrawn, and this claim be allowed.

Claim 2 depends from claim 1, and claim 4 depends from claim 3. By virtue of this dependency, Applicant submits that claims 2 and 4 are allowable for at least the same reasons given above with respect to claims 1 and 3, where applicable. In addition, Applicant submits that claims 2 and 4 are further distinguished over *Okada* and *Nakami* by the additional elements recited therein, and particularly with respect to each claimed combination. Applicant respectfully requests, therefore, that the rejection of claims 6-9, 11-13, and 15-18 under 35 U.S.C. §103 be withdrawn, and these claims be allowed.

Newly Added Claims

As discussed above, claims 5 and 6 have been added.

Claim 5 recites an FIR digital filter using as an interpolation function a function obtained by composing a function based on a cubic convolution method and a function based on a bilinear method for an interpolation signal between discrete original pixels used for calculating an output pixel value. Neither *Okada* nor *Nakami*, nor any other prior art of record in the instant application, either singly or combined disclose, teach, or suggest at least composing a function based on a cubic convolution method and a function based on a bilinear method for an interpolation signal between discrete original pixels used for calculating an output pixel value. For at least this reason, Applicant respectfully requests that claim 5 be considered and allowed.

Claim 6 depends from claim 5 and additionally recites that the electronics apparatus is for enlarging or reducing the digital image. By virtue of this dependency, and particularly with respect to the additional elements recited therein, Applicant submits that claim 6 is allowable for at least the same reasons given above with respect to claim 5. Applicant respectfully requests, therefore, that claim 6 be considered and allowed.

Conclusion

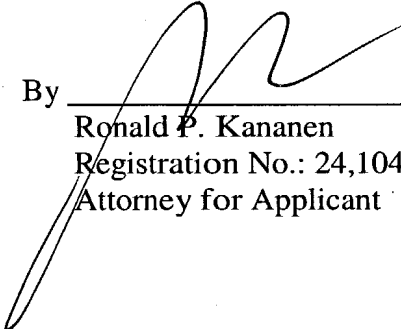
Based on at least the foregoing amendments and remarks, Applicant submits that claims 1-6 are allowable, and this application is in condition for allowance. Accordingly, Applicant requests favorable reexamination and reconsideration of the application. In the event the Examiner has any comments or suggestions for placing the application in even better form, Applicant requests that the Examiner contact the undersigned attorney at the number listed below.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 18-0013, under Order No. SON-2213 from which the undersigned is authorized to draw.

Dated: September 30, 2004

Respectfully submitted,

By



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